#15 (Appeal Brief) 6/26/03

PATENT

IN THE UNITED STATEDS PATENT AND TRADEMARK OFFICE

In re application of

Bryan Patrick Livergood et al. **June 20, 2003**

Serial No.: **09/885,311** Group Art: **1756**

Filed: **June 20, 2001** Examiner: **Rodee, Christopher D.**

Title: **RANDOM COPOLYMERS USED AS COMPATIBLIZERS IN TONER COMPOSITIONS**

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

BRIEF ON APPEAL

Before the Board of Appeals and Interferences

In response to the Final Rejection mailed April 7, 2003, please enter this Brief on Appeal.

REAL PARTY IN INTEREST

The real party in interest is Lexmark International, Inc., a corporation of the state of Delaware, which owns the entire interest in this patent application and the underlying invention.

RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences which will directly affect or be directly affected by or have a bearing on the Board's decision in this pending appeal.

STATUS OF CLAIMS

Claims 1, 3-22 are pending, are presently rejected, and are the subject of this appeal. Claims 9 and 20 are hereby withdrawn from consideration as redundant to claims 10 and 19 respectively. Claim 30 is allowed. Claims 2 has been canceled and its subject

matter incorporated into claim 1. Claims 22-29 were restricted and have been canceled in this application. No other claims have been presented.

STATUS OF AMENDMENTS

An amendment after Final Rejection was submitted canceling four sentences in the specification and amendmg "resembles" to read ""has domains resembling" in another line. For continuity in a line following a deletion "They" is amended to read "Random copolymers" (In this amendment "copolymers" was inadvertently not underlined to show it as added. This clerical error is regretted.)

This amendment was not entered on the basis that it changes the meaning of the claims and therefore was new matter and on the basis that it should have been made earlier. (With respect to the amendments being late similar amendments had been made before the Final Rejection, but the examiner had found fault with them, and the amendments after Final Rejection were intended to respond to that.)

SUMMARY OF THE INVENTION

Dry electrostatic toners generally comprise fine particles of a blend of binder resin, coloring matter, and a charge control agent (p. 2, l. 5-p. 3, l. 6). A widely used additional element in the toner particles is a wax, which functions to facilitate clean release of toner from a hot fuser member (p. 5, l. 1-22).

Generally, the wax is not compatible with the resin and tends to agglomerate into large domains (p. 5, l. 25-28). This large separation of wax and binder causes a range of problems known in the art, such as separation of high proportions of wax into fines (p. 6, l. 7-11).

Compatibilization is a term for reducing the separation between the wax and the resin (p. 7, l. 17-28). It may be done physically, as by adding one or more ingredients, termed compatibilizers (p. 8, l. 6-8).

A type of compatibilizer is a molecule having one or more sections closely similar to the resin and one or more sections similar to the wax (p. 8, l. 8-12). Graft polymers and block polymers are known compatibilizers (p.8, l. 7-8; p. 12, l. 1-8)

The invention of this application is to employing random copolymers as the compatibilizer, providing a cost reduction to that of block and graft copolymers (p. 12, l. 22-27). The production of a random copolymer requires little process control and thus may be custom made at low cost (p. 13, l. 8-11). Also, many suitable random copolymers are available as commodity materials. (p. 13, l. 11-12).

Page 14, line 22 through page 15, line 21 of the specification describes random copolymers in terms of their creation by polymerization when the two components have reactivity ratio rates between zero and infinity. (The reactivity ratio rate is that of monomer self addition versus co-monomer addition (p. 14, l. 26-27)). Between the extremes of zero and infinity, copolymers containing segments of varying lengths will result (p. 15, l. 5-6). This portion of the specification concludes as follows: "For the purposes of producing a co-polymer in one reaction step that is suitable for use as a compatibilizer, it is most desirable to have the situation in which r1 and r2 are both much greater than 1." (p. 15, l. 18-21). (The r1 and r2 symbols represent the reactivity ratios (p. 15, l. 6-18)).

The foregoing parts of the specification are believed to be a clear and unambiguous description of a classic random copolymer. The rejection takes the position that certain more general statements in the specification define the claims and rejects on the basis of a

prior art, which uses the word "random," but qualifies the term as "shaded" random. Similarly, a rejection is made applying an alternating polymer teaching as an anticipation.

The undersigned deferred to the position of the examiner by attempting to delete all such general statements and to amend "resembles" to "has domains resembling" in another sentence.

The sentences asked to be deleted are as follows:

"It is also known in the art that block copolymers are one end of a spectrum of copolymers that ranges from alternating to block copolymers. This is to say that for a copolymer made from A and B monomers, one end of the spectrum is a polymer comprised of strictly alternating A-B-A-B units (an "alternating copolymer"), while the other end is a polymer having one end A-A-A in a single block with the other end B-B-B in a single block (a "block copolymer"). Random copolymers lie within these two extremes." (p. 12, l. 8-14).

"They range from the extreme of "pure" alternating copolymers to "pure blockly" copolymers." (p. 14, l. 23-24)

The sentence in which "resembling" is sought to be amended to "has domains resembling" immediately follows the preceding sentence sought to be deleted. It is as follows (added matter underlined, deleted matter crossed through): The degree to which a random copolymer has domains resembling ~~resembles~~ a "pure block" or a "pure alternating" copolymer depends upon the conditions under which it was polymerized." (p. 14, l. 24-26).

With these deletions and change only copolymers consistent with page 14, line 22 through page 15, line 21 as discussed in the foregoing are described as random in the specification.

ISSUES

ISSUE 1: Whether claims 1, 3-9, 11, 12, 14, 21, and 22 are anticipated by U.S. Patent No. 5,955,235 to Lin.

ISSUE 2: Whether claims 1, 3-10, 12, and 22 are anticipated by U.S. Patent No. 4,027,048 to Crystal.

ISSUE 3: Whether claims 1, 3-10, 12-18, and 20-22 are obvious over the Crystal reference in view of U.S. Patent No. 5,972,553 to Katada and further in view of U.S. Patent No. 5,985,501 to Sato et al.

ISSUE 4: Whether claims 11 and 19 are obvious over the Crystal reference in view of the Katada reference and further in view of the Sata reference and further in view of U.S. Patent No. 5,384,724 to Mahabadi et al.

GROUPING OF CLAIMS

Claims 1, 3-8, 10-19, and 21-22 for purposes of this appeal are grouped to stand and fall together. Claim 30 is allowed and not at issue in this appeal. Claims 9 and 20 are withdrawn by this brief as redundant. Claims 23-29 were restricted for purposes of examination and have been canceled in this application.

ARGUMENT

The Meaning of Random Copolymer in the Claims

The rejection employs certain general statements in the specification to interpret the term "random copolymer" to encompass alternating and block copolymers. To the extent such statements in the specification support that, they have been and continue to be disavowed as being claimed. As discussed under Summary of the Invention in the

foregoing, all such general statements have been sought to be canceled, or, in one case, be corrected to be more specific.

This is entirely analogous to filing with a broad set of claims, supported by a broad disclosure, and subsequently amending to claim more narrowly. The more specific disclosure is not being changed, and it is that more specific disclosure which is the basis of the pending claims.

Certainly, a deletion can be prohibited new matter, (for example, deleting a "not" would normally change a meaning materially). Such is not the case here, as the more specific disclosure is left essentially unchanged. The fact that certain general statements might be interpreted broadly does not negate the accuracy of a specific disclosure.

Accordingly, an examination corresponding to the clearly stated, intended meaning of the claims should be made. Of course, the body of the potential patent might be improved in some way. The response after final rejection presented one, entirely reasonable way to achieve that. The examiner should propose a different solution to improving the body of the text if the proposed one is not satisfactory. The undersigned knows of no doctrine in patent law that permits the examiner to demand that the claims must mean something different than their clear wording when those claims are supported by an accurate and specific disclosure in the specification and the applicant makes clear he is directing the claims to that. As a consequence, all rejections outstanding are faulty since they are based on an erroneous interpretation of the claims.

ISSUE 1

Claims 1, 3-9, 11, 12, 14, 21, and 22 are rejected as anticipated by the Lin reference. However, Lin does not use the term "random" with respect to the compatibilizer and is applied for disclosing regularly alternating copolymers of olefin

component and imide component. Claim 1, the independent claim in this rejection, requires that the compatibilizer be random. This rejection appears based entirely on the erroneous claim interpretation discussed in the foregoing. Lin is simply not relevant with respect to a truly random copolymer as claimed.

ISSUE 2

Claims 1, 3-10, 12, and 22 are rejected as anticipated by Crystal. Claim 1, the independent claim in this rejection, requires that the compatibilizer be random. The term "random" in this application and in common dictionary definition of "lacking a definite pattern" does not permit of modification with respect to a defined structural order. Hence, the Crystal patent is not pertinent since Crystal refers to a "shaded copolymer," which could not be suggestive of true random.

The term "shaded" to modify "random copolymer" has no more meaning than "straight curve," which is a contradiction and therefore has no meaning at all. In fact, Crystal describes the shaded copolymer as "a random copolymer in which one end of the chain has a high concentration of one component of the copolymer and the other end of the chain has a high concentration of a second component of the copolymer." (col. 4, l. 49-53). Thus, the Crystal shaded copolymer is simply not random regardless of mention of random in its description.

Regarding the term "consisting of" which replaced "comprising" by amendment, that term in the claim refers to the secondary resin for the purpose of negating any implication that the term "random" in the claims means anything but truly random throughout the resin claimed. The term only modifies the claimed secondary resin and does not exclude other compatibilizers in the toner composition as a whole.

ISSUE 3

Claims 1, 3-10, 12-18, and 20-22 are rejected as obvious over the Crystal reference in view of the Katada reference and further in view of the Sato reference. However, the Crystal reference is now overcome as discussed in the foregoing. Katada and Sato are cited for teaching polyolefins, such as polyethylene and polypropylene waxes, as release agents. Crystal is the only teaching regarding the random copolymer, and such teachings of Katada and Sato could not supply the deficiencies of Crystal as a reference in that Crystal does not teach or suggest a truly random copolymer as claimed.

ISSUE 4

Claims 11 and 19 are rejected as obvious over Crystal in view of Katada and Sato as applied to claims 1-10, 12-18, and 20-22 and further in view of Mahabadi. As just discussed, Katada and Sato could not supply the deficiencies of Crystal as a reference in that Crystal does not teach or suggest a truly random copolymer as claimed. Mahabadi is cited for teaching olefins as a toner resin component. Similarly, such teaching could not supply the deficiencies as a reference of Crystal

PRAYER FOR RELIEF

In accordance with the foregoing, it is respectfully requested that claims 1 3-8, 10-19 and 21-22, all of the rejected claims, be allowed. Claim30 is allowed. Claims 9 and 20 are withdrawn as redundant and may be deemed cancelled.

Respectfully submitted,

Bryan Patrick Livengood et al.

John A. Brady, Reg. No 22,020
Attorney for Applicants
Lexmark International, Inc.
Intellectual Property Law Dept.
740 W. New Circle Road
Lexington, KY 40550
(859) 232-4785

APPENDIX

Pending Claims

1. A toner composition comprising:

a) a primary resin having a polymeric structure comprising at least one distinct repeating structural unit;

b) at least one wax release agent having a polymeric structure comprising at least one distinct repeating structural unit; and

c) a secondary resin at least partially compatibalizing said primary resin and said wax consisting of a random copolymer, wherein the structure of said random copolymer has at least one repeating structural unit compatible with at least one distinct repeating structural unit of said primary resin and at least one other repeating structural unit which is compatible with at least one distinct repeating structural unit of said wax release agent.

3. The composition of claim 1, wherein said random copolymer is present in an amount effective to produce maximum wax domain sizes of about 0.5-3.5 microns in the finished toner, as measured by Scanning Electron Microscopy

4. The composition of claim 3, wherein said maximum was domain sizes are in the range of from about 1 to about 2.5 microns.

5. The composition of claim 1, wherein said toner composition is particulate having toner particles and fines separated from said toner particles, and wherein said random copolymer is present in an amount effective to reduce the differential of wax contents between said toner particles and said fines particles to less than about 20 weight percent

6. The composition of claim 5, wherein said differential of wax contents is less than about 10 weight percent.

7. The composition of claim 1, wherein said primary resin comprises a resin selected from the group consisting of homopolymers and copolymers of styrene and substituted styrene, acrylic and (meth)acrylic polymers and copolymers, polyvinyl chloride, polyvinyl alcohol, polyolefins, polyurethanes, polyamides, polymers and copolymers of epoxides, and polymers and copolymers of esters.

8. The composition of claim 7, wherein said primary resin comprises at least one homopolymer and copolymer of styrene and substituted styrene.

9. The composition of claim 7, wherein said primary resin comprises at least one (meth)acrylate repeating structural unit. [This brief withdraws this claim as redundant to claim 10.]

10. The composition of claim 7, wherein said primary resin comprises at least one (meth)acrylic acid repeating structural unit.

11. The composition of claim 7, wherein said primary resin comprises a polyolefin.

12. The composition of claim 7, wherein said primary resin comprises a honopolymer or copolymer of styrene or substituted styrene. [Correction of "honopolymer" to "homopolymer" will be made after appeal.]

13. The composition of claim 1, wherein said secondary resin comprises different repeating structural units in proportions such that the proportion of said repeating structural units compatible with said repeating distinct structural units present in said primary resin exceeds the proportion of said repeating structural unit compatible with said repeating distinct structural unit present in said wax release agent.

14. The composition of claim 1, wherein the structural units present in the secondary resin that are compatible with distinct repeating structural units present in the wax release agent are in the range of about 5 to about 95 weight percent of the molecular weight of the secondary resin.

15. The composition of claim 1, wherein said structural units present in the secondary resin that are compatible with distinct repeating structural units present in the wax release agent are in the range of about 60 to about 85 weight percent of the molecular weight of the secondary resin.

16. The composition of claim 1, wherein said secondary resin is an ethylene/n-butyl acrylate random copolymer.

17. The composition of claim 1, wherein said secondary resin is an ethylene/ethyl acrylate/styrene random copolymer with a number-average molecular weight of at least 40,000 g/mole.

18. The composition of claim 10, wherein said wax release agent is selected from the group consisting of polyethylene, polypropylene, copolymers of ethylene and propylene, and mixtures there of, and said secondary resin contains at least one repeating structural unit comprising a styrene group.

19. The composition of claim 11, wherein said wax release agent is selected from the group consisting of polyethylene and polypropylene, copolymers of ethylene and propylene, and mixtures thereof, and said secondary resin contains at least one repeating structural unit comprising a (meth)acrylate group.

20. The composition of claim 11, wherein said wax release agent is selected from the group consisting of polyethylene and polypropylene, copolymers of ethylene and propylene, and mixtures thereof, and said secondary resin contains at least one repeating structural unit comprising a (meth)acrylic acid group. [This brief withdraws this claim as redundant to claim 19.]

21. The composition of claim 12, wherein said wax release agent is selected from the group consisting of polyethylene and polypropylene, copolymers of ethylene and propylene, and mixtures thereof, and said secondary resin contains at least one repeating structural unit comprising an olefin group.

22. A developer comprising the toner composition of claim 1.

30. In a toner composition comprising about 100 parts of a styrene/acrylic random copolymer base resin and about 3 parts of a polyethylene wax additive, the improvement comprising:

said composition including a high number-average molecular weight random copolymer compatibilizer present in said toner composition at a level that is about 1.5 weight percent relative to the weight of said styrene/acrylic random copolymer, wherein said compatibilizer comprises 81 weight percent ethylene and 19 weight percent n-butyl acrylate monomer units.